#7

Figure 1

Streptococcus mutans
***ComCDE* Operon**

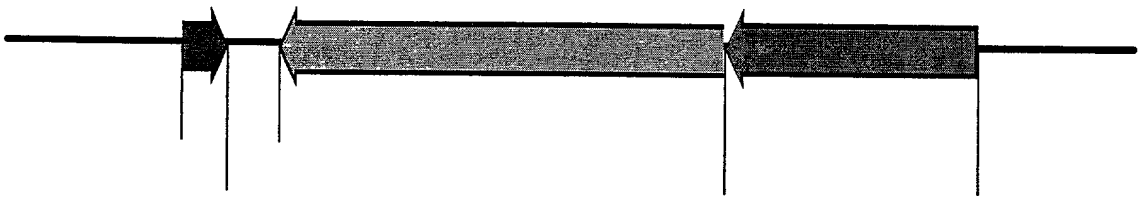

Figure 2

A.

[ATGAAAAAAACACTATCATTAAAAAATGACTTTAAAGAAATTAAGACTGATGAATTAG
AGATTATCATTGGCGGA (AGCGGAAGCCTATCAACATTTTTCCGGCTGTTTAACAGAAG
TTTTACACAAGCTTTGGGAAAA)] TAA

B.

AGCGGAAGCCTATCAACATTTTTCCGGCTGTTTAACAGAAGTTTTACACAAGCTTTGGG
AAAA

C.

[ATGAATGAAGCCTTAATGATACTTTCAAATGGTTTATTAACTTATCTAACCGTTCTAT
TTCTCTTGTTTCTATTTTCTAAGGTAAGTAATGTCACTTTATCGAAAAAGGAATTAACT
CTTTTTTCGATAAGCAATTTTCTGATAATGATTGCTGTTACGATGGTGAACGTAAACCT
GTTTTATCCTGCAGAGCCTCTTTATTTTATAGCTTTATCAATTTATCTTAATAGACAGA
ATAGTCTTTCTCTAAATATATTTTATGGTCTGCTGCCTGTTGCCAGTTCTGACTTGTTT
AGGCGGGCAATCATATTCTTTATCTTGGATGGAACTCAAGGAATTGTAATGGGCAGTAG
CATTATAACCACCTATATGATCGAGTTTGCAGGAATAGCGCTAAGTTACCTCTTTCTCA
GTGTGTTCAATGTTGATATTGGTCGACTTAAAGATAGTTTGACCAAGATGAAGGTCAAA
AAACGCTTGATTCCAATGAATATTACTATGCTTCTATACTACCTTTTAATACAGGTATT
GTATGTTATAGAGAGTTATAATGTGATACCGACTTTAAAATTTCGTAAATTTGTCGTTA
TTGTCTATCTTATTTTATTTTTGATTCTGATCTCATTTTTAAGCCAATATACCAAACAA
AAGGTTCAAAATGAGATAATGGCACAAAAGGAAGCTCAGATTCGAAATATCACCCAGTA
TAGTCAGCAAATAGAATCTCTTTACAAGGATATTCGAAGTTTCCGCCATGATTATCTGA
ATATTTTAACTAGCCTCAGATTAGGCATTGAAAATAAAGATTTAGCTAGTATTGAAAAG
ATTTACCATCAAATCTTAGAAAAAACAGGACATCAATTGCAGGATACCCGTTATAATAT
CGGCCATCTAGCTAATATTCAAAACGATGCTGTCAAGGGTATCTTGTCAGCAAAAATCT
TAGAAGCTCAGAATAAAAAGATTGCTGTCAATGTAGAAGTCTCAAGTAAAATACAACTG
CCTGAGATGGAGTTGCTTGATTTCATTACCATACTTTCTATCTTGTGTGATAATGCCAT
TGAGGCTGCTTTCGAATCATTAAATCCTGAAATTCAGTTAGCCTTTTTTAAGAAAAATG
GCAGTATAGTCTTTATCATTCAGAATTCCACCAAAGAAAAACAAATAGATGTGAGTAAA
ATTTTTAAAGAAAACTATTCCACTAAAGGCTCCAATCGCGGTATTGGTTTAGCAAAGGT
GAATCATATTCTTGAACATTATCCCAAAACCAGTTTACAAACAAGCAATCATCATCATT
TATTCAAGCAACTCCTAATAATAAAA] TAG

D.

[ATGATTTCTATTTTTGTATTGGAAGATGATTTTTTACAACAAGGACGTCTTGAAACCA
CCATTGCAGCTATCATGAAAGAAAAAAATTGGTCTTATAAAGAATTGACTATTTTTGGA
AAACCACAACAACTTATTGACGCTATCCCTGAAAAGGGCAATCACCAGATTTTCTTTTT
GGATATTGAAATCAAAAAAGAGGAAAAGAAAGGACTGGAAGTAGCCAATCAGATTAGAC
AGCATAATCCTAGTGCAGTTATTGTCTTTGTCACGACACATTCTGAGTTTATGCCCCTC
ACTTTTCAGTATCAGGTATCTGCTTTGGATTTTATTGATAAATCTTTGAATCCTGAGGA
GTTCTCCCACCGCATTGAATCAGCGCTGTATTATGCTATGGAAAACAGCCAGAAGAATG
GTCAATCAGAGGAACTTTTTATTTTCCATTCATCTGAAACTCAGTTTCAGGTCCCTTTT
GCTGAGATTCTGTATTTTGAAACATCTTCAACAGCCCATAAGCTCTGCCTTTATACTTA
TGATGAACGGATTGAATTCTACGGCAGTATGACTGACATTGTTAAAATGGATAAGAGAC

Figure 2 (cont'd)

TTTTTCAGTGCCATCGCTCTTTTATTGTCAATCCTGCCAATATTACCCGTATTGATCGG
AAAAAACGCTTGGCCTATTTTCGAAATAATAAGTCTTGTCTTATTTCACGAACTAAGTT
AACAAAACTGAGAGCTGTGATTGCTGATCAAAGGAGAGCAAAA]TGA

Figure 3

A.

MKKTLSLKNDFKEIKTDELEIIIGGSGSLSTFFRLFNRSFTQALGK

B.

MNEALMILSNGLLTYLTVLFLLFLFSKVSNVTLSKKELTLFSISNFLIMIAVTMVNVNL
FYPAEPLYFIALSIYLNRQNSLSLNIFYGLLPVASSDLFRRAIIFFILDGTQGIVMGSS
IITTYMIEFAGIALSYLFLSVFNVDIGRLKDSLTKMKVKKRLIPMNITMLLYYLLIQVL
YVIESYNVIPTLKFRKFVVIVYLILFLILISFLSQYTKQKVQNEIMAQKEAQIRNITQY
SQQIESLYKDIRSFRHDYLNILTSLRLGIENKDLASIEKIYHQILEKTGHQLQDTRYNI
GHLANIQNDAVKGILSAKILEAQNKKIAVNVEVSSKIQLPEMELLDFITILSILCDNAI
EAAFESLNPEIQLAFFKKNGSIVFIIQNSTKEKQIDVSKIFKENYSTKGSNRGIGLAKV
NHILEHYPKTSLQTSNHHHLFKQLLIIK

C.

MISIFVLEDDFLQQGRLETTIAAIMKEKNWSYKELTIFGKPQQLIDAIPEKGNHQIFFL
DIEIKKEEKKGLEVANQIRQHNPSAVIVFVTTHSEFMPLTFQYQVSALDFIDKSLNPEE
FSHRIESALYYAMENSQKNGQSEELFIFHSSETQFQVPFAEILYFETSSTAHKLCLYTY
DERIEFYGSMTDIVKMDKRLFQCHRSFIVNPANITRIDRKKRLAYFRNNKSCLISRTKL
TKLRAVIADQRRAK

Figure 4

A.

```
BM71 CSP      1 MKKTPSLKNDFKEIKTDELEIIIGGSGSLSTFFRLFNRSFTQALGK 46
GB14 CSP      1 MKKTLSLKNDFKEIKTDELEIIIGGSGSLSTFFRLFNRSFTQALGK 46
H7 CSP        1 MKKTLSLKNDFKEIKTDELEIIIGGSGSLSTFFRLFNRSFTQALGK 46
JH1005 CSP    1 MKKTLSLKNDFKEIKTDELEIIIGGSGTLSTFFRLFNRSFTQA     43
LT11 CSP      1 MKKTLSLKNDFKEIKTDELEIIIGGSGSLSTFFRLFNRSFTQALGK 46
NG8 CSP       1 MKKTLSLKNDFKEIKTDELEIIIGGSGSLSTFFRLFNRSFTQALGK 46
UAB159 CSP    1 MKKTLSLKNDFKEIKTDELEIIIGGSGSLSTFFRLFNRSFTQALGK 46
                **** **********************.***************
```

B.

```
consensus: 1 MKKTLSLKNDFKEIKTDELEIIIGG SGSLSTFFRLFNRSFTQALGK 46
predicted cleavage site:              ^
```

Figure 5

```
SGSLSTFFRLFNRSFTQALGK
```

Figure 6

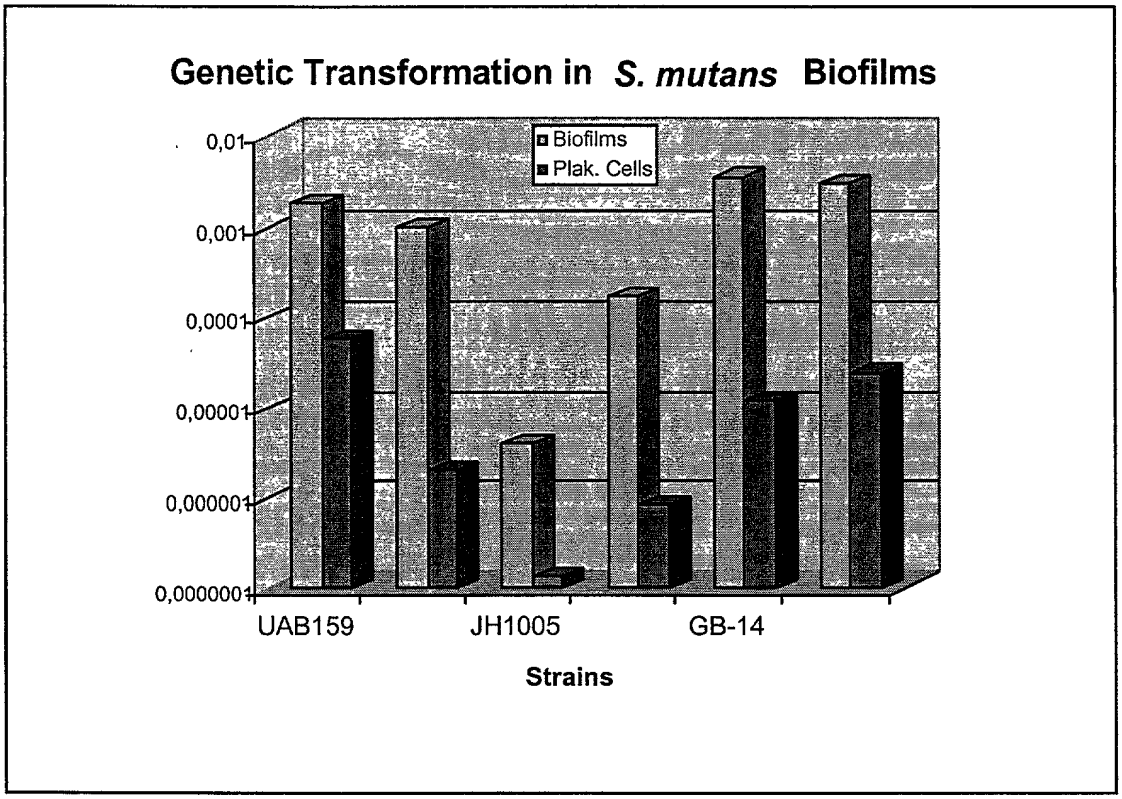
Genetic Transformation in S. mutans Biofilms
Biofilms
Plak. Cells
0,01
0,001
0,0001
0,00001
0,000001
0,0000001
UAB159
JH1005
GB-14
Strains

Figure 7

Strain	Peptide added Number of Transformants/Recipients	No peptide Number of Transformants/Recipients
UAB15	4.65×10^{-1}	1.78×10^{-6}
JH1005[2]	6.98×10^{-2}	0

[1]The final concentration of SCSP used was 500 ng/ml.
The strain contains a nonsense mutation in the *comC* gene encoding the CSP.

Figure 8

ComC region

ComC Primer Pair: F5-B5

[F5] 23406-23424 5'- AGTTTTTTGTCTGGCTGCG -3'
19 nt forward primer
pct G+C: 47.4 Tm: 50.5

[B5] 24056-24037 5'- TCCACTAAAGGCTCCAATCG -3'
20 nt backward primer
pct G+C: 50.0 Tm: 51.9

651 nt product for F5-B5 pair (23406-24056)
Optimal annealing temp: 50.3
pct G+C: 30.9 Tm: 71.5

ComD region

ComD Primer Pair: F1-B1

[F1] 392-415 5'- CGCTAAGTTACCTCTTTCTCAGTG -3'
24 nt forward primer
pct G+C: 45.8 Tm: 51.6

[B1] 683-663 5'- GCTTCCTTTTGTGCCATTATC -3'
21 nt backward primer
pct G+C: 42.9 Tm: 50.8

292 nt product for F1-B1 pair (392-683)
Optimal annealing temp: 49.5
pct G+C: 30.8 Tm: 70.2

ComE region

ComE Primer Pair: F1-B1

[F1] 145-165 5'- CCTGAAAAGGGCAATCACCAG -3'
21 nt forward primer
pct G+C: 52.4 Tm: 55.9

[B1] 606-585 5'- GCGATGGCACTGAAAAAGTCTC -3'
22 nt backward primer
pct G+C: 50.0 Tm: 55.4

462 nt product for F1-B1 pair (145-606)
Optimal annealing temp: 53.6
pct G+C: 38.3 Tm: 74.1

Figure 9

Sequence Range: 1 to 2557

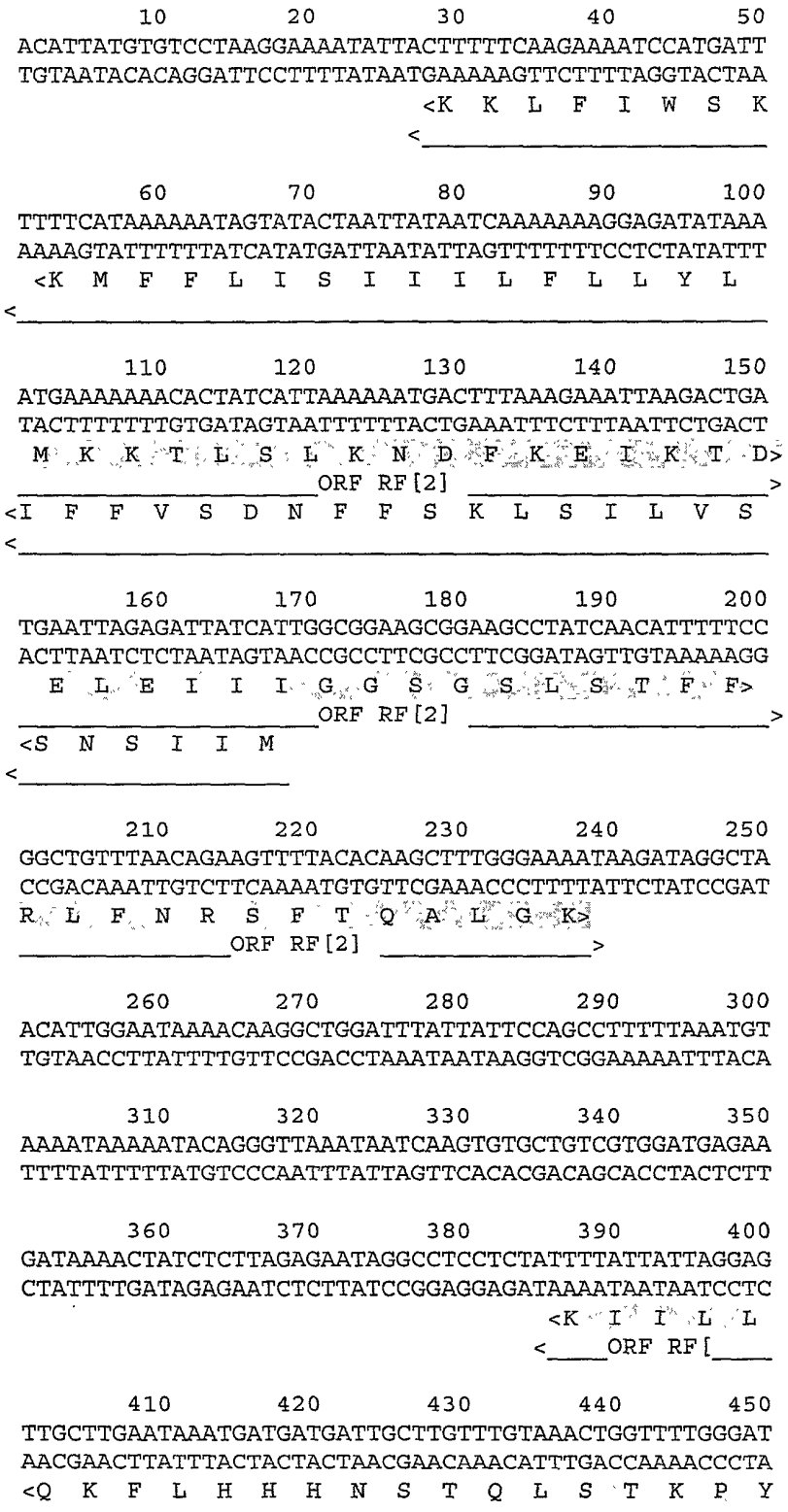

Figure 9 (cont'd - 1)

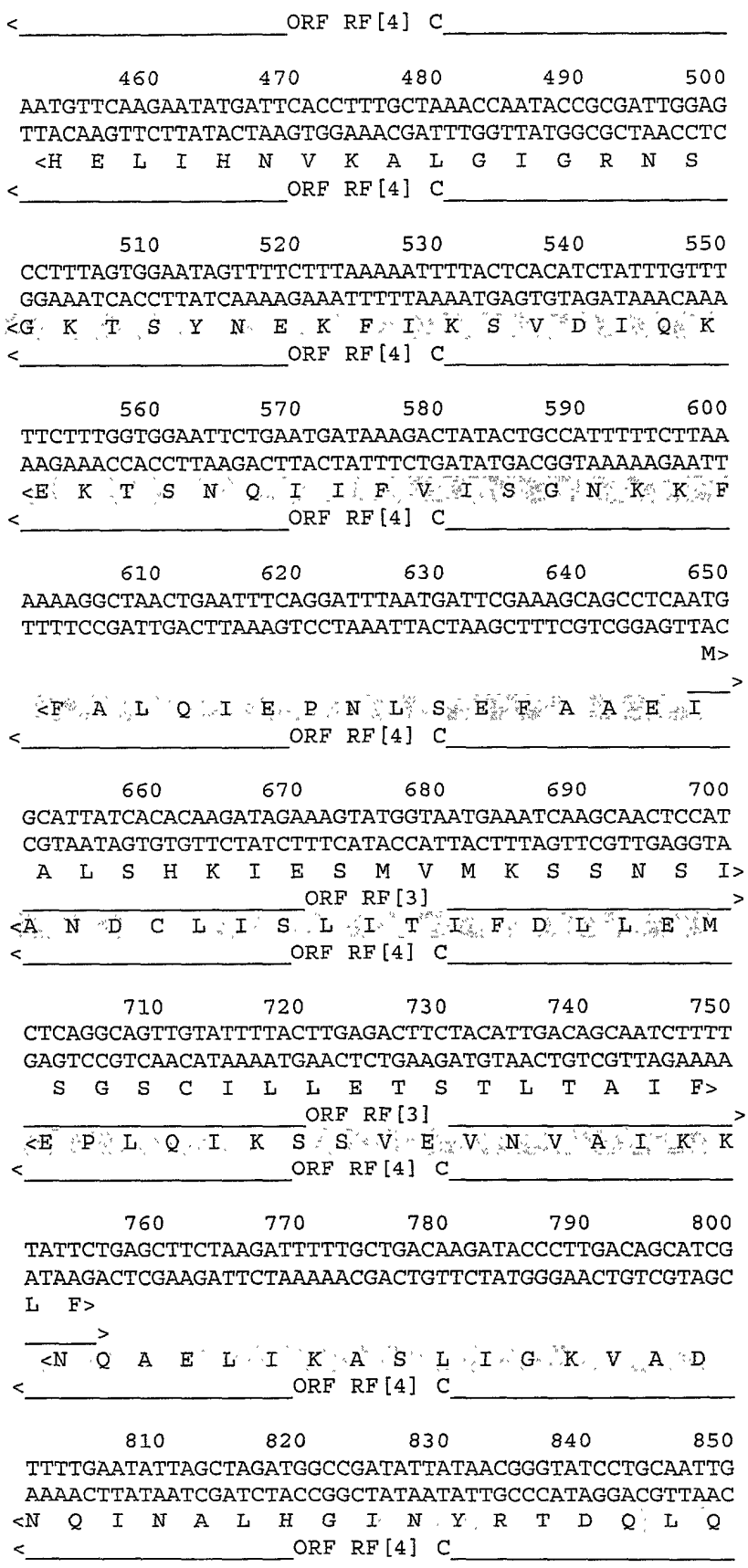

Figure 9 (cont'd - 2)

```
        860         870         880         890         900
ATGTCCTGTTTTTTCTAAGATTTGATGGTAAATCTTTTCAATACTAGCTA
TACAGGACAAAAAAGATTCTAAACTACCATTTAGAAAAGTTATGATCGAT
 <H  G  T  K  E  L  I  Q  H  Y  I  K  E  I  S  A  L
<_____________________ORF RF[4] C_____________________

        910         920         930         940         950
AATCTTTATTTTCAATGCCTAATCTGAGGCTAGTTAAAATATTCAGATAA
TTAGAAATAAAAGTTACGGATTAGACTCCGATCAATTTTATAAGTCTATT
  <D  K  N  E  I  G  L  R  L  S  T  L  I  N  L  Y
<_____________________ORF RF[4] C_____________________

        960         970         980         990        1000
TCATGGCGGAAACTTCGAATATCCTTGTAAAGAGATTCTATTTGCTGACT
AGTACCGCCTTTGAAGCTTATAGGAACATTTCTCTAAGATAAACGACTGA
   M  A  E  T  S  N  I  L  V  K  R  F  Y  L  L  T>
 _____________________________________________________>
<D  H  R  F  S  R  I  D  K  Y  L  S  E  I  Q  Q  S
<_____________________ORF RF[4] C_____________________

       1010        1020        1030        1040        1050
ATACTGGGTGATATTTCGAATCTGAGCTTCCTTTTGTGCCATTATCTCAT
TATGACCCACTATAAAGCTTAGACTCGAAGGAAAACACGGTAATAGAGTA
 I  L  G  D  I  S  N  L  S  F  L  L  C  H  Y  L  I>
 _____________________________________________________>
 <Y  Q  T  I  N  R  I  Q  A  E  K  Q  A  M  I  E  N
<_____________________ORF RF[4] C_____________________

       1060        1070        1080        1090        1100
TTTGAACCTTTTGTTTGGTATATTGGCTTAAAAATGAGATCAGAATCAAA
AAACTTGGAAAACAAACCATATAACCGAATTTTTACTCTAGTCTTAGTTT
  L  N  L  L  F  G  I  L  A>
 ____________________________>
  <Q  V  K  Q  K  T  Y  Q  S  L  F  S  I  L  I  L
<_____________________ORF RF[4] C_____________________

       1110        1120        1130        1140        1150
AATAAAATAAGATAGACAATAACGACAAATTTACGAAATTTTAAAGTCGG
TTATTTTATTCTATCTGTTATTGCTGTTTAAATGCTTTAAAATTTCAGCC
<F  L  I  L  Y  V  I  V  V  F  K  R  F  K  L  T  P
<_____________________ORF RF[4] C_____________________

       1160        1170        1180        1190        1200
TATCACATTATAACTCTCTATAACATACAATACCTGTATTAAAAGGTAGT
ATAGTGTAATATTGAGAGATATTGTATGTTATGGACATAATTTTCCATCA
 <I  V  N  Y  S  E  I  V  Y  L  V  Q  I  L  L  Y  Y
<_____________________ORF RF[4] C_____________________

       1210        1220        1230        1240        1250
ATAGAAGCATAGTAATATTCATTGGAATCAAGCGTTTTTTGACCTTCATC
TATCTTCGTATCATTATAAGTAACCTTAGTTCGCAAAAAACTGGAAGTAG
  <L  L  M  T  I  N  M  P  I  L  R  K  K  V  K  M
<_____________________ORF RF[4] C_____________________

       1260        1270        1280        1290        1300
TTGGTCAAACTATCTTTAAGTCGACCAATATCAACATTGAACACACTGAG
```

Figure 9 (cont'd - 3)

```
 AACCAGTTTGATAGAAATTCAGCTGGTTATAGTTGTAACTTGTGTGACTC
<K  T  L  S  D  K  L  R  G  I  D  V  N  F  V  S  L
<_____________________ORF RF[4] C_____________________

      1310       1320       1330       1340       1350
 AAAGAGGTAACTTAGCGCTATTCCTGCAAACTCGATCATATAGGTGGTTA
 TTTCTCCATTGAATCGCGATAAGGACGTTTGAGCTAGTATATCCACCAAT
 <F  L  Y  S  L  A  I  G  A  F  E  I  M  Y  T  T  I
<_____________________ORF RF[4] C_____________________

      1360       1370       1380       1390       1400
 TAATGCTACTGCCCATTACAATTCCTTGAGTTCCATCCAAGATAAAGAAT
 ATTACGATGACGGGTAATGTTAAGGAACTCAAGGTAGGTTCTATTTCTTA
  <I  S  S  G  M  V  I  G  Q  T  G  D  L  I  F  F
<_____________________ORF RF[4] C_____________________
                     <L  E  K  L  E  M  W  S  L  S  Y
                     <_____________________________________

      1410       1420       1430       1440       1450
 ATGATTGCCCGCCTAAACAAGTCAGAACTGGCAACAGGCAGCAGACCATA
 TACTAACGGGCGGATTTGTTCAGTCTTGACCGTTGTCCGTCGTCTGGTAT
<I  I  A  R  R  F  L  D  S  S  A  V  P  L  L  G  Y
<_____________________ORF RF[4] C_____________________
  <S  Q  G  G  L  C  T  L  V  P  L  L  C  C  V  M
<_____________________________________________________

      1460       1470       1480       1490       1500
 AAATATATTTAGAGAAAGACTATTCTGTCTATTAAGATAAATTGATAAAG
 TTTATATAAATCTCTTTCTGATAAGACAGATAATTCTATTTAACTATTTC
 <F  I  N  L  S  L  S  N  Q  R  N  L  Y  I  S  L  A
<_____________________ORF RF[4] C_____________________

      1510       1520       1530       1540       1550
 CTATAAAATAAAGAGGCTCTGCAGGATAAAACAGGTTTACGTTCACCATC
 GATATTTTATTTCTCCGAGACGTCCTATTTTGTCCAAATGCAAGTGGTAG
  <I  F  Y  L  P  E  A  P  Y  F  L  N  V  N  V  M
<_____________________ORF RF[4] C_____________________

      1560       1570       1580       1590       1600
 GTAACAGCAATCATTATCAGAAAATTGCTTATCGAAAAAAGAGTTAATTC
 CATTGTCGTTAGTAATAGTCTTTTAACGAATAGCTTTTTTCTCAATTAAG
<T  V  A  I  M  I  L  F  N  S  I  S  F  L  T  L  E
<_____________________ORF RF[4] C_____________________

      1610       1620       1630       1640       1650
 CTTTTTCGATAAAGTGACATTACTTACCTTAGAAAATAGAAACAAGAGAA
 GAAAAAGCTATTTCACTGTAATGAATGGAATCTTTTATCTTTGTTCTCTT
 <K  K  S  L  T  V  N  S  V  K  S  F  L  F  L  L  F
<_____________________ORF RF[4] C_____________________

      1660       1670       1680       1690       1700
 ATAGAACGGTTAGATAAGTTAATAAACCATTTGAAAGTATCATTAAGGCT
 TATCTTGCCAATCTATTCAATTATTTGGTAAACTTTCATAGTAATTCCGA
  <L  V  T  L  Y  T  L  L  G  N  S  L  I  M  L  A
<_____________________ORF RF[4] C_____________________

      1710       1720       1730       1740       1750
```

Figure 9 (cont'd - 4)

```
 TCATTCATTTTGCTCTCCTTTGATCAGCAATCACAGCTCTCAGTTTTGTT
 AGTAAGTAAAACGAGAGGAAACTAGTCGTTAGTGTCGAGAGTCAAAACAA
<E  N  M
<________
        <K  A  R  R  Q  D  A  I  V  A  R  L  K  T
       <_________________ORF RF[5] C_________________

       1760       1770       1780       1790       1800
 AACTTAGTTCGTGAAATAAGACAAGACTTATTATTTCGAAAATAGGCCAA
 TTGAATCAAGCACTTTATTCTGTTCTGAATAATAAAGCTTTTATCCGGTT
<L  K  T  R  S  I  L  C  S  K  N  N  R  F  Y  A  L
<_____________________ORF RF[5] C_____________________

       1810       1820       1830       1840       1850
 GCGTTTTTTCCGATCAATACGGGTAATATTGGCAGGATTGACAATAAAAG
 CGCAAAAAAGGCTAGTTATGCCCATTATAACCGTCCTAACTGTTATTTTC
 <R  K  K  R  D  I  R  T  I  N  A  P  N  V  I  F  S
<_____________________ORF RF[5] C_____________________

       1860       1870       1880       1890       1900
 AGCGATGGCACTGAAAAAGTCTCTTATCCATTTTAACAATGTCAGTCATA
 TCGCTACCGTGACTTTTTCAGAGAATAGGTAAAATTGTTACAGTCAGTAT
      M  A  L  K  K  S  L  I  H  F  N  N  V  S  H>
 _____________________ORF RF[1] _____________________>
  <R  H  C  Q  F  L  R  K  D  M  K  V  I  D  T  M
<_____________________ORF RF[5] C_____________________
                                                    <V
                                                    <__

       1910       1920       1930       1940       1950
 CTGCCGTAGAATTCAATCCGTTCATCATAAGTATAAAGGCAGAGCTTATG
 GACGGCATCTTAAGTTAGGCAAGTAGTATTCATATTTCCGTCTCGAATAC
 T  A  V  E  F  N  P  F  I  I  S  I  K  A  E  L  M>
 _____________________ORF RF[1] _____________________>
<S  G  Y  F  E  I  R  E  D  Y  T  Y  L  C  L  K  H
<_____________________ORF RF[5] C_____________________
  <A  T  S  N  L  G  N  M  M  L  I  F  A  S  S  I
<_____________________ORF RF[6] C_____________________

       1960       1970       1980       1990       2000
 GGCTGTTGAAGATGTTTCAAAATACAGAATCTCAGCAAAAGGGACCTGAA
 CCGACAACTTCTACAAAGTTTTATGTCTTAGAGTCGTTTTCCCTGGACTT
  G  C>
 _______>
 <A  T  S  S  T  E  F  Y  L  I  E  A  F  P  V  Q  F
<_____________________ORF RF[5] C_____________________
<P  Q  Q  L  H  K  L  I  C  F  R  L  L  L  S  R  F
<_____________________ORF RF[6] C_____________________

       2010       2020       2030       2040       2050
 ACTGAGTTTCAGATGAATGGAAAATAAAAAGTTCCTCTGATTGACCATTC
 TGACTCAAAGTCTACTTACCTTTTATTTTTCAAGGAGACTAACTGGTAAG
  <Q  T  E  S  S  H  F  I  F  L  E  E  S  Q  G  N
<_____________________ORF RF[5] C_____________________
 <S  L  K  L  H  I  S  F  L  F  N  R  Q  N  V  M  R
<_____________________ORF RF[6] C_____________________
```

Figure 9 (cont'd - 5)

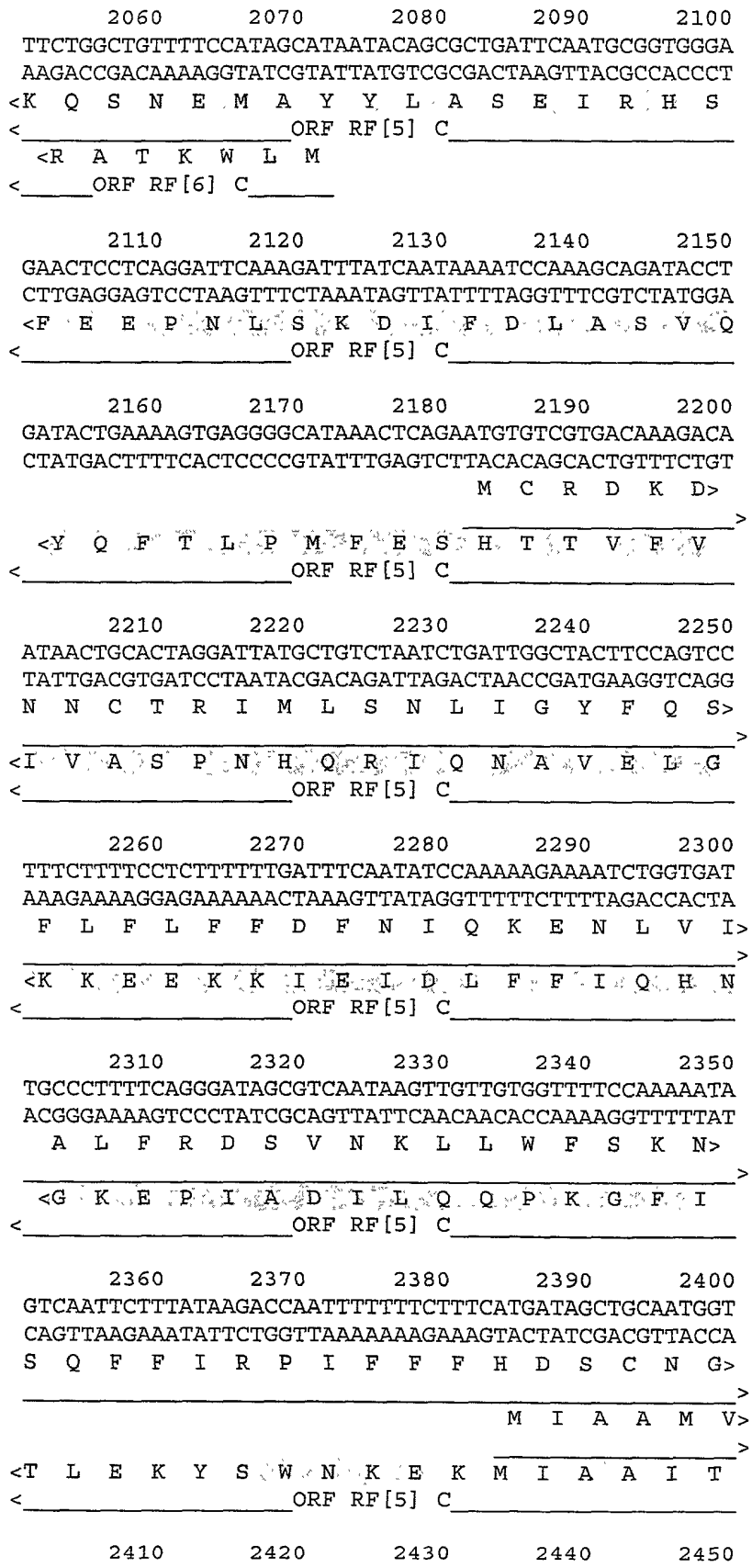

Figure 9 (cont'd - 6)

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GGTTTCAAGACGTCCTTGTTGTAAAAAATCATCTTCCAATACAAAAATAG
CCAAAGTTCTGCAGGAACAACATTTTTTAGTAGAAGGTTATGTTTTTATC
 G  F  K  T  S  L  L>
_____________________>
  V  S  R  R  P  C  C  K  K  S  S  S  N  T  K  I>
_____________________________________________________>
<T  E  L  R  G  Q  Q  L  F  D  D  E  L  V  F  I  S
<____________________ORF RF[5] C____________________

      2460       2470       2480       2490       2500
AAATCATTATTTCTCCTTTAATCTTCTATTTAGGTTAGCTGATTAACACT
TTTAGTAATAAAGAGGAAATTAGAAGATAAATCCAATCGACTAATTGTGA
E  I  I  I  S  P  L  I  F  Y  L  G>
_____________________________________>
 <I  M
<_______

      2510       2520       2530       2540       2550
ATACACAGAAAAGGTATAAAACGATATCACTCAATAAAATCTACTAACTT
TATGTGTCTTTTCCATATTTTGCTATAGTGAGTTATTTTAGATGATTGAA

AATAACC
TTATTGG
```

Figure 10

A.

ATGGAAGAAGATTTTGAAATTGTTTTTAATAAGGTTAAGCCAATTGTATGGAAATTAAG
CCGTTATTACTTTATTAAAATGTGGACTCGTGAAGATTGGCAACAAGAGGGAATGTTGA
TTTTGCACCAATTATTAAGGGAACATCCAGAATTAGAAGAGGATGATACAAAATTGTAT
ATCTATTTTAAGACACGTTTTTCTAATTACATTAAAGATGTTTTGCGTCAGCAAGAAAG
TCAGAAACGTCGTTTTAATAGAATGTCTTATGAAGAAGTCGGTGAGATTGAACACTGTT
TGTCAAGTGGCGGTATGCAATTGGATGAATATATTTTATTTCGTGATAGTTTGCTTGCA
TATAAACAAGGTCTGAGTACTGAAAAGCAAGAGCTGTTTGAGCGCTTGGTAGCAGGAGA
GCACTTTTTGGGAAGGCAAAGTATGCTGAAAGATTTACGTAAAAAATTAAGTGATTTTA
AGGAAAAA

B.

MEEDFEIVFNKVKPIVWKLSRYYFIKMWTREDWQQEGMLILHQLLREHPELEEDDTKLY
IYFKTRFSNYIKDVLRQQESQKRRFNRMSYEEVGEIEHCLSSGGMQLDEYILFRDSLLA
YKQGLSTEKQELFERLVAGEHFLGRQSMLKDLRKKLSDFKEK

C.

GTAAATAAAACAGCCAGTTAAGATGGGACATTTATGTCCTGTTCTTAAAGTCTTTTTCG
TTTTATAATAATTTTATTATAAAAGGAGGTCATCGTAATAGATGGAAGAAGATTTTGAA
ATTGTTTTTAATAAGGTTAAGCCAATTGTATGGAAATTAAGCCGTTATTACTTTATTAA
AATGTGGACTCGTGAAGATTGGCAACAAGAGGGAATGTTGATTTTGCACCAATTATTAA
GGGAACATCCAGAATTAGAAGAGGATGATACAAAATTGTATATCTATTTTAAGACACGT
TTTTCTAATTACATTAAAGATGTTTTGCGTCAGCAAGAAAGTCAGAAACGTCGTTTTAA
TAGAATGTCTTATGAAGAAGTCGGTGAGATTGAACACTGTTTGTCAAGTGGCGGTATGC
AATTGGATGAATATATTTTATTTCGTGATAGTTTGCTTGCATATAAACAAGGTCTGAGT
ACTGAAAAGCAAGAGCTGTTTGAGCGCTTGGTAGCAGGAGAGCACTTTTTGGGAAGGCA
AAGTATGCTGAAAGATTTACGTAAAAAATTAAGTGATTTTAAGGAAAAATAGTTAAAAA
GGGAAAGAATGGAACATGTGATTGTACCATTCTTTTTGGTTGAAAATTAAGAAAAGTTA
TTATAAATTATTGGTTTAACATGCCATATTA

Figure 11

A.

ATGAAACAAGTTATTTATGTTGTTTTAATCGTCATAGCCGTTAACATTCTCTTAGAGAT
TATCAAAAGAGTAACAAAAAGGGGAGGGACAGTTTCGTCATCTAATCCTTTACCAGATG
GGCAGTCTAAGTTGTTTTGGCGCAGACATTATAAGCTAGTACCTCAGATTGATACCAGA
GACTGTGGGCCGGCAGTGCTGGCATCTGTTGCAAAGCATTACGGATCTAATTACTCTAT
CGCTTATCTGCGGGAACTCTCAAAGACTAACAAGCAGGGAACAACAGCTCTTGGCATTG
TTGAAGCTGCTAAAAAGTTAGGCTTTGAAACACGCTCTATCAAGGCGGATATGACGCTT
TTTGATTATAATGATTTGACCTATCCTTTTATCGTCCATGTGATTAAAGGAAAACGTCT
GCAGCATTATTATGTCGTCTATGGCAGCCAGAATAATCAGCTGATTATTGGAGATCCTG
ATCCTTCAGTTAAGGTGACTAGGATGAGTAAGGAACGCTTTCAATCAGAGTGGACAGGC
CTTGCAATTTTCCTAGCTCCTCAGCCTAACTATAAGCCTCATAAAGGTGAAAAAAATGG
TTTGTCTAATTTCTTCCCGTTGATCTTTAAGCAGAAAGCTTTGATGACTTATATTATCA
TAGCTAGCTTGATTGTGACGCTCATTGATATTGTCGGATCATACTATCTCCAAGGAATA
TTGGACGAGTACATTCCTGATCAGCTGATTTCAACTTTAGGAATGATTACGATTGGTCT
GATAATAACCTATATTATCCAGCAGGTCATGGCTTTTGCAAAAGAATACCTCTTGGCCG
TACTCAGTTTGCGTTTAGTCATTGATGTTATCCTGTCTTATATCAAACATATTTTTACG
CTTCCTATGTCTTTCTTTGCGACAAGGCGAACAGGAGAAATCACGTCTCGTTTTACAGA
TGCCAATCAGATTATTGATGCTGTAGCGTCAACCATCTTTTCAATCTTTTTAGATATGA
CTATGGTAATTTTGGTTGGTGGGGTTTTGTTGGCGCAAAACAATAACCTTTTCTTTCTA
ACCTTGCTCTCCATTCCGATTTATGCCATCATTATTTTTGCTTTCTTGAAACCCTTTGA
GAAAATGAATCACGAAGTGATGGAAAGCAATGCTGTGGTAAGTTCTTCTATCATTGAAG
ATATCAATGGGATGGAAACCATTAAATCACTCACAAGTGAGTCCGCTCGTTATCAAAAC
ATTGATAGTGAATTTGTTGATTATTTGGAGAAAAACTTTAAGCTACACAAGTATAGTGC
CATTCAAACCGCATTAAAAAGCGGTGCTAAGCTTATCCTCAATGTTGTCATTCTCTGGT
ATGGCTCTCGTCTAGTTATGGATAATAAAATCTCAGTTGGTCAGCTTATCACCTTTAAT
GCTTTGCTGTCTTATTTCTCAAATCCAATTGAAAATATTATCAATCTGCAATCCAAACT
GCAGTCAGCTCGCGTTGCCAATACACGTCTTAATGAGGTCTATCTTGTCGAATCTGAAT
TTGAAAAAGACGGCGATTTATCAGAAAATAGCTTTTTAGATGGTGATATTTCGTTTGAA
AATCTTTCTTATAAATATGGATTTGGGCGAGATACCTTATCAGATATTAATTTATCAAT
CAAAAAAGGCTCCAAGGTCAGTCTAGTTGGAGCCAGTGGTTCTGGTAAAACAACTTTGG
CTAAACTGATTGTCAATTTCTACGAGCCTAACAAGGGGATTGTTCGAATCAATGGCAAT
GATTTAAAAGTTATTGATAAGACAGCTTTGCGGCGGCATATTAGCTATTTGCCGCAACA
GGCCTATGTTTTTAGTGGCTCTATTATGGATAATCTCGTTTTAGGAGCTAAAGAAGGAA
CGAGTCAGGAAGACATTATTCGTGCTTGTGAAATTGCTGAAATCCGCTCGGACATTGAA
CAAATGCCTCAGGGCTATCAGACAGAGTTATCAGATGGTGCCGGTATTTCTGGCGGTCA
AAAACAGCGGATTGCTTTAGCTAGGGCCTTATTAACACAGGCACCGGTTTTGATTCTGG
ATGAAGCCACCAGCAGTCTTGATATTTTGACAGAAAAGAAAATTATCAGCAATCTCTTA
CAGATGACGGAGAAAACAATAATTTTTGTTGCCCACCGCTTAAGCATTTCACAGCGTAC
TGACGAAGTCATTGTCATGGATCAGGGAAAAATTGTTGAACAAGGCACTCATAAGGAAC
TTTTAGCTAAGCAAGGTTTCTATTATAACCTGTTTAAT

Figure 11 (cont'd)

B.

MKQVIYVVLIVIAVNILLEIIKRVTKRGGTVSSSNPLPDGQSKLFWRRHYKLVPQIDTR
DCGPAVLASVAKHYGSNYSIAYLRELSKTNKQGTTALGIVEAAKKLGFETRSIKADMTL
FDYNDLTYPFIVHVIKGKRLQHYYVVYGSQNNQLIIGDPDPSVKVTRMSKERFQSEWTG
LAIFLAPQPNYKPHKGEKNGLSNFFPLIFKQKALMTYIIIASLIVTLIDIVGSYYLQGI
LDEYIPDQLISTLGMITIGLIITYIIQQVMAFAKEYLLAVLSLRLVIDVILSYIKHIFT
LPMSFFATRRTGEITSRFTDANQIIDAVASTIFSIFLDMTMVILVGGVLLAQNNNLFFL
TLLSIPIYAIIIFAFLKPFEKMNHEVMESNAVVSSSIIEDINGMETIKSLTSESARYQN
IDSEFVDYLEKNFKLHKYSAIQTALKSGAKLILNVVILWYGSRLVMDNKISVGQLITFN
ALLSYFSNPIENIINLQSKLQSARVANTRLNEVYLVESEFEKDGDLSENSFLDGDISFE
NLSYKYGFGRDTLSDINLSIKKGSKVSLVGASGSGKTTLAKLIVNFYEPNKGIVRINGN
DLKVIDKTALRRHISYLPQQAYVFSGSIMDNLVLGAKEGTSQEDIIRACEIAEIRSDIE
QMPQGYQTELSDGAGISGGQKQRIALARALLTQAPVLILDEATSSLDILTEKKIISNLL
QMTEKTIIFVAHRLSISQRTDEVIVMDQGKIVEQGTHKELLAKQGFYYNLFN

C.

ATGGATCCTAAATTTTTACAAAGTGCAGAATTTTATAGGAGACGCTATCATAATTTTGC
GACACTATTAATTGTTCCTTTGGTCTGCTTGATTATCTTCTTGGTCATATTCCTTTGTT
TTGCTAAAAAAGAAATTACAGTGATTTCTACTGGTGAAGTTGCACCAACAAAGGTTGTA
GATGTTATCCAATCTTACAGTGACAGTTCAATCATTAAAAATAATTTAGATAATAATGC
AGCTGTTGAGAAGGGAGACGTTTTAATTGAATATTCAGAAAATGCCAGTCCAAACCGTC
AGACTGAACAAAAGAATATTATAAAAGAAAGACAAAAACGAGAAGAGAAGGAAAAGAAA
AAACACCAAAAGAGCAAGAAAAAGAAGAAGTCTAAGAGCAAGAAAGCTTCCAAAGATAA
GAAAAAGAAATCGAAAGACAAGGAAAGCAGCTCTGACGATGAAAATGAGACAAAAAAGG
TTTCGATTTTTGCTTCAGAAGATGGTATTATTCATACCAATCCCAAATATGATGGTGCC
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AAAAGTGTTAATCACCTATTATGCTTCTTCTGATGATGTTGTTTCTATGAAAAAGGGGC
AAACCGCTCGTCTTTCCTTGGAAAAAAAGGGAAATGACAAGGTTGTTATTGAAGGAAAA
ATTAACAATGTCGCTTCATCAGCAACTACTACTAAAAAAGGAAATCTCTTTAAGGTTAC
TGCCAAAGTAAAGGTTTCTAAGAAAAATAGCAAACTCATCAAGTATGGTATGACAGGCA
AGACAGTCACTGTCATTGATAAAAAGACTTATTTTGATTATTTCAAAGATAAATTACTG
CATAAAATGGATAAT

D.

MDPKFLQSAEFYRRRYHNFATLLIVPLVCLIIFLVIFLCFAKKEITVISTGEVAPTKVV
DVIQSYSDSSIIKNNLDNNAAVEKGDVLIEYSENASPNRQTEQKNIIKERQKREEKEKK
KHQKSKKKKKSKSKKASKDKKKKSKDKESSSDDENETKKVSIFASEDGIIHTNPKYDGA
NIIPKQTEIAQIYPDIQKTRKVLITYYASSDDVVSMKKGQTARLSLEKKGNDKVVIEGK
INNVASSATTTKKGNLFKVTAKVKVSKKNSKLIKYGMTGKTVTVIDKKTYFDYFKDKLL
HKMDN

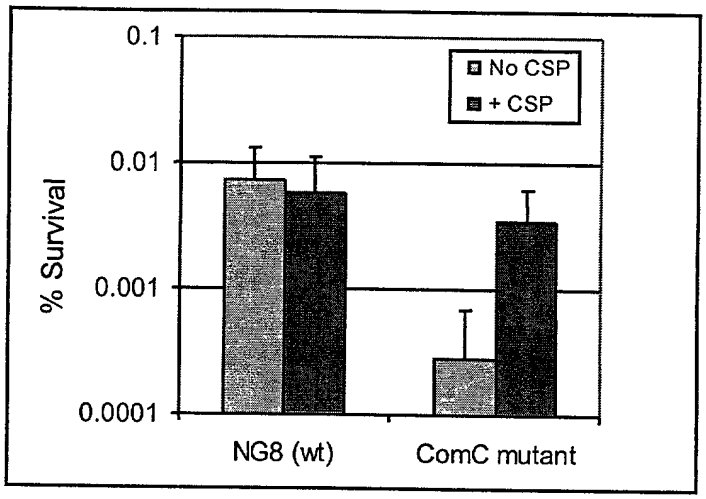

Figure 12